

DESCRIPTION OF THE MALE AND VARIATION IN
BOLBODIMYIA GALINDOI FAIRCHILD (DIPTERA: TABANIDAE),
AND A REVISED KEY TO SPECIES OF *BOLBODIMYIA*

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Abstract.—The male of *Bolbodimyia galindoi* Fairchild from Costa Rica is described for the first time and compared with the female. Variation in the color of *B. galindoi* throughout its known range from Costa Rica to Colombia is discussed. A revised key to the genus *Bolbodimyia* is provided.

Key Words: Diptera, Tabanidae, variation, *Bolbodimyia galindoi*, Neotropical region, key to species of *Bolbodimyia*

Recent examination of Tabanidae from the National Museum of Natural History collection (USNM), the Instituto Nacional de Biodiversidad collection (INBIO) in Costa Rica, and the Florida State Collection of Arthropods (FSCA), has turned up two males and five females of *Bolbodimyia galindoi* Fairchild from Costa Rica, a species until now represented in collections by only three females, two from Panama (the type locality and another site) and one from Colombia. The females show considerable variation not mentioned by Fairchild (1964) in his original description or by Wilkerson (1979) in his treatment of Tabanidae from Colombia. The male of *B. galindoi* is described here and variation in females is discussed.

The genus *Bolbodimyia* Bigot was last revised by Stone (1954). Since that time, three additional species have been described, and the genus is currently represented by 13 described species. Therefore, in addition to describing the male of *Bolbodimyia galindoi* Fairchild, and variation in that species, it is appropriate to provide a new key to species to facilitate identification. *Bolbodimyia* is a Neotropical genus occurring from Argentina to Mexico, with

one species extending into central Arizona and New Mexico. Most species are found in Central and Northern South America (Fairchild and Burger 1994).

Bolbodimyia can be distinguished from other genera of Tabanidae by the following combination of characteristics: body black or orange and black; subcallus strongly inflated (Figs. 2, 3) and shining black or yellow and black; antennal scape strongly inflated and bulbous (Fig. 3), shining black; wing partly to entirely blackened except for hyaline apex; vein R_4 strongly curved upward; tibiae distinctly inflated; male with upper $\frac{2}{3}$ of eye bearing enlarged facets that are strongly differentiated from area of small facets below, area of small facets extending around posterior margin of eye to vertex.

Little is known of the immature stages, except for two species, *Bolbodimyia atrata* (Hine), described by Burger (1977), and *B. bermudezi* Tidwell and Philip, described by Tidwell and Philip (1977). The known immature stages occur in moss in waterfalls and rapidly flowing streams. The males of six species are known, *B. atrata*, *B. brunneipennis* Stone, *B. galindoi*, *B. lampros* Philip and Floyd, *B. lateralis* Kröber, and

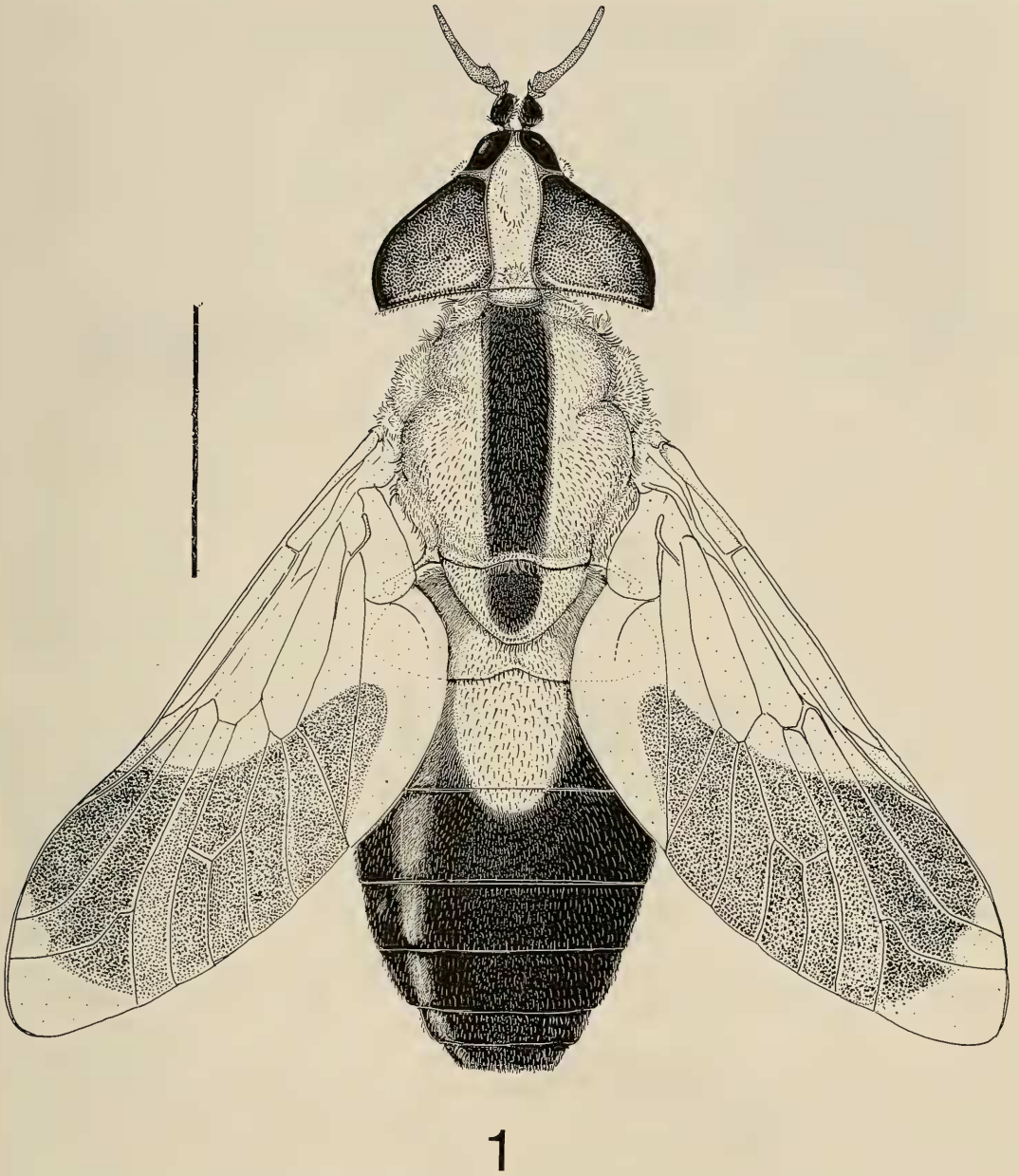


Fig. 1. Adult female of *Bolbodimyia galindoi* - dark form, dorsal view. Scale bar = 4.0 mm.

B. philipi Stone, and are similar to the females in coloration. The female of *B. lampros* is undescribed; the male was described by Philip and Floyd (1974) from Mexico.

Bolbodimyia galindoi Fairchild
(Figs. 1-5)

Bolbodimyia galindoi Fairchild, 1964: 172,

fig. 5; Wilkerson, 1979: 232-234; Fairchild, 1986: 37.

Male.—Body length 12.6-13.6 mm, wing length 9.6-10.0 mm. Similar to female except for usual sexual differences and the following characteristics. Eyes with facets of upper $\frac{2}{3}$ distinctly enlarged, green

with darker center, strongly differentiated from black area of small facets below, smaller facets extended around posterior margin of eye to vertex. Subcallus strongly inflated, shining black dorsally with median yellow to reddish band and yellow to reddish ventrally. Apical palpomere of maxillary palpus relatively slender and elongate, 3 times longer than broad, acutely pointed apically, reddish brown basally, dusky apically, bearing mixed orange and black hairs.

Mesoscutum orange, median dark stripe reduced to pale brown shadow, entirely orange haired. Scutellum shining light brown with orange lateral margins, orange haired. Legs entirely black except basal $\frac{1}{3}$ of anterior forecoxae orange and orange haired. Wing (Fig. 5) with membrane and veins bright orange-yellow, except for large jet-black subapical patch extending diagonally from vein R_1 at distal margin of stigma through angular curve of vein R_4 and along vein R_5 to posterior margin of wing in cell R_4 , wing apex yellowish, posterior half of wing from vein R_5 to anal cell orange-yellow, not darkened as in female.

Abdomen varying from shining black, overlain with thin gray tomentum, entirely orange haired to black with broad median brown streak on tergites 1–3, tergites 5–6 mostly to entirely yellow-brown, and sternites 1–5 irregularly yellowish brown and black.

COSTA RICA: Guanacaste, Parque Guanacaste Nacional, Estación Pitilla, Río Orosí, 10.991 N, 85.428 W, 19–20. vi. 1988, el. 700 m, C. M. & O. S. Flint, Holtzental, 1 ♂ (USNM); Est. Maritza, 600 m, Iado O Vol. Orosi, Prov. Guanacaste, 27 Feb 1992, M. I. Ortiz, L N., 1 ♂ (INBIO 326900 373000 #1505).

VARIATION IN FEMALES OF *B. GALINDOI*

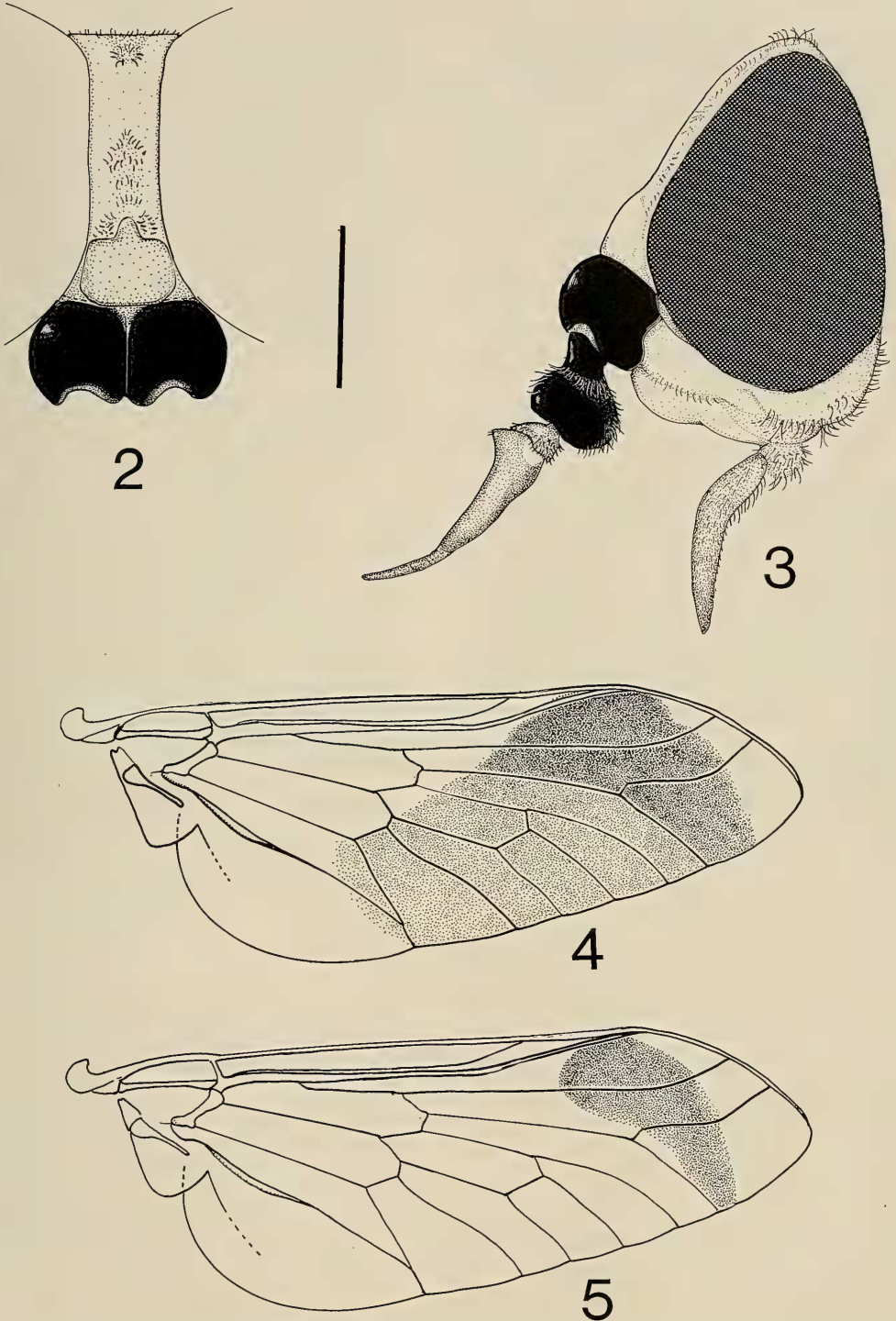
Wilkerson (1979) compared 2 females, 1 each from Panama and Colombia, with the holotype female. The specimen from Panama had lighter areas of the body paler yellow or orange-yellow, yellowish brown and dark

brown maxillary palpi, and 2 brown, yellow-orange haired sublateral stripes on the abdominal tergites. The female from Colombia had the frontal callus yellowish brown, maxillary palpi wholly yellow-orange haired, mesoscutum entirely orange, with only scattered black hairs in place of a distinct dark stripe, and a diffuse yellow-orange middorsal stripe dorsally on the abdomen.

Five females of *B. galindoi* from Costa Rica were examined and compared with the holotype and the females examined by Wilkerson. Locality data for the specimens are as follows: COSTA RICA: Guan. [acaste], 3 km SE R. Naranjo, July 1992, F. D. Parker, 1 ♀ (FSCA); 14 km S. Cañas, 5–10 Sep[tember] 1990, F. D. Parker, 1 ♀ (FSCA); Her.[édia Province], La Selva Res. Sta., 11–17 Jun[e] 1986, Nadeer Youssef, 1 ♀ (FSCA); Alejuela Prov., Rio Peñas Blancas, May 1993, Frank J. Joyce, 1 ♀ (INBIO); Puntarenas Prov., Monteverde, Peñas Blancas, 5 May 1993, Frank J. Joyce, 1 ♀ (INBIO).

Four of the above specimens represent a dark form of *B. galindoi*. The specimen from Monteverde (Fig. 1) has an abdominal pattern intermediate between the wholly black abdomen of the other 4 specimens from Costa Rica and the holotype female from Panama that has the abdominal tergites orange with broad sublateral black stripes. The most conspicuous differences in the Costa Rica specimens are the wholly black apical palpomere and femora, the more intensely blackened posterior area of the wing (Fig. 4) that is nearly as intense as the jet black subapical wing patch anterior to vein R_{4+5} , and the wholly black abdomen.

There is some intraspecific variation in the Costa Rica specimens, but all are darker than the specimens from Panama and Colombia. Body length is 12–14 mm, frons usually orange-brown tomentose, but may be slightly darkened, basal callus orange to reddish brown, apical palpomere of maxillary palpi entirely black with black setae to black with extreme base yellowish, scutellum mostly black with only lateral margins orange, but more extensively orange with



Figs. 2-5. Head and wing of *Bolbodimyia galindoi*. 2, Front and subcallus of female. 3, Lateral view of female head showing antennae and maxillary palpi. 4, Wing of female. 5, Wing of male. Scale bar = 1.0 mm.

dark spot reduced in the female from Monteverde, legs entirely black with black hair to black with basal halves of fore and hind coxae orange with orange hair and extreme bases of femora orange-yellow.

The abdominal markings and hair patterns are variable. Most commonly the entire abdomen is black with patches of orange hair medianly on the tergites 1-2 and covering sternites 2-3. Orange hairs also may be present on the lateral margins of tergites 1-2 or 1-3. The female from La Selva has the lateral margins of tergites 1-2 orange with orange hair and sternites 1-2 reddish with sublateral dusky spots. The abdominal pattern of the female from Monteverde (Fig. 1) is intermediate between the dark Costa Rica specimens and the holotype female from Panama, having orange color and hairs on tergites 1-2 and the anterior 1/4 of tergite 3 medianly and laterally, tergite 2 with sublateral black stripes, sternites 1-2 and the base of sternite 3 orange with orange hair, and sternite 2 with a dark median spot.

Wilkerson (1979) commented on the variability of *B. galindoi* and suggested that either more than 1 species was involved or that *B. galindoi* was single variable species. Initially, I was inclined to consider the dark Costa Rica specimens to be a distinct species, but because the males collected from Costa Rica generally agree with Fairchild's description of *B. galindoi*, except for the evanescent mesoscutal stripe, absence of infuscation posteriorly on the wing membrane, and the darker legs, and because a female from Costa Rica has an abdominal pattern intermediate between that of Fairchild's specimen from Panama and the wholly black abdomen of the other females from Costa Rica, I now consider the darker specimens to be only a variant of *B. galindoi*, pending study of additional specimens.

KEY TO SPECIES OF *BOLBODIMYIA*

1. Mesoscutum entirely orange or orange with a broad black median stripe; wings broadly or-

- ange-yellow basally, with a large diagonal dark marking (♀) or black subapical wing patch (♂) [Costa Rica to Panama]
- *galindoi* Fairchild (♀, ♂)
- Mesoscutum not entirely orange or marked as above, usually black except for notopleural lobes or prealar lobes; wings not orange-yellow basally, dark wing markings not as above 2
- 2. Thorax and abdomen entirely dark brown or black, or thorax at most with tufts of pale yellow hairs on prealar lobes 3
- At least some orange or yellow on thorax or abdomen (may be evanescent in *brunneipennis*) 6
- 3. Hyaline apex of wing small, confined to cell R₄, not entering cell R₃; genae chocolate brown [Colombia, Ecuador, Peru]
- *nigra* Stone (♀)
- Hyaline apex of wing more extensive, extending to vein R₂₊₃ into cell R₁; genae shining black or orange 4
- 4. Head and legs entirely black; tarsi concolorous with tibiae [Arizona, New Mexico, Mexico] *atrata* (Hine) (♀, ♂)
- Frontoclypeus and genae orange; at least mid and hind basitarsis pale 5
- 5. Frons black; wings darkened anteriorly, subhyaline posterior to anterior edge of cell br and veins R₃ and R₅ [Mexico]
- *bermudezi* Tidwell & Philip (♀)
- Frons orange; wings usually more extensively darkened posteriorly [Costa Rica, Panama, Colombia] *erythrocephala* (Bigot) (♀)
- 6. Coxae and maxillary palpi partly to mostly orange 7
- Coxae and maxillary palpi black or dark brown 8
- 7. Frons and subcallus shining black-brown to black; maxillary palpi with some infuscation on distal half; femora black-brown except at extreme base [Venezuela, Colombia, Bolivia]
- *bicolor* Bigot (♀)
- Frons usually orange, rarely reddish brown to dark brown (♀); subcallus entirely orange, or orange to light brown medianly; maxillary palpi entirely orange; fore femur at least half orange basally, mid and hind femora mostly orange [Guatemala, El Salvador, Costa Rica, Panama, Colombia, Ecuador]
- *philipi* Stone (♀, ♂)
- 8. Abdomen entirely black 9
- Abdomen partly or entirely orange, at least with narrow pale midventral stripe 10
- 9. Entire wing darkened except for hyaline apex; hyaline apex not extending to vein R₂₊₃; genae opaque brown with some orange tomentum

- and hairs ventrally [Colombia, e. Peru] . . .
 *celeroides* Stone (♀)
- Darkened area of wing restricted to area anterior to cell br and vein R₄₊₅; otherwise subhyaline; hyaline apex of wing starting at apex of vein R₂₊₃; genae shining black, without orange hairs [Mexico, Guatemala]
 *dampfi* Philip (♀)
- 10. Abdomen entirely orange, black-haired dorsally, orange-haired ventrally [Mexico] . . .
 *lampros* Philip & Floyd (♂)
- Abdomen with orange on venter, sometimes limited to lateral stripes or a median stripe or both 11
- 11. Frons of female and center of subcallus of male orange; abdomen orange along lateral margins of sternites, mostly black medianly [Argentina, Bolivia] . . . *lateralis* Kröber (♀, ♂)
- Frons of female at least dark reddish brown to black; abdomen ventrally either entirely orange or dark with a more or less evident median orange stripe 12
- 12. Abdomen entirely orange ventrally; flagellum of antenna dark brown; length 15 mm [Bolivia, e. Peru] *desecta* Enderlein (♀)
- Abdomen black ventrally with a narrow, sometimes rather obscure median yellow-orange stripe, and often some orange near base laterally; flagellum of antenna mostly yellow-orange to yellow-brown; length 10-12 mm [Brazil, Guyana]
 *brunneipennis* Stone (♀, ♂)

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